



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,121	06/30/2006	Tsukasa Maruyama	21713-00032-US1	8319
30678	7590	07/18/2011	EXAMINER	
CONNOLLY BOVE LODGE & HUTZ LLP			CHAN, HENG M	
1875 EYE STREET, N.W.				
SUITE 1100			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20006			1728	
			MAIL DATE	DELIVERY MODE
			07/18/2011	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/585,121 Examiner HENG CHAN	MARUYAMA ET AL. Art Unit 1728

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 12 May 2011.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-20 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-20 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____ .

## **DETAILED ACTION**

### ***Status of Application***

1. Applicant's amendments and remarks filed 5/12/2011 have been acknowledged.  
Claims 1-20 are pending.

### ***Claim Objections***

2. The previous objection to claim 9 has been withdrawn as a result of Applicants' amendments.

### ***Claim Rejections - 35 USC § 112***

3. The previous rejection of claim 6 under 35 USC 112, 2<sup>nd</sup> paragraph has been withdrawn as a result of Applicants' amendments and further consideration.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**4. Claims 1-5 and 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable by WO 2004/017452 to Yoshikawa et al. (English equivalent US 2005/0260786 used for citation), as evidenced by EP 1622178 to Zakeerunddin et al., in view of JP 10-245453 to Tanaka et al. (machine translation provided for citation).**

Regarding claims 1-3, Yoshikawa et al. teach an electrolyte for a photovoltaic device comprising an ionic liquid, e.g. 1,2 dimethyl-3-propylimidazolium iodide or an oxidation-reduction substance solution containing 1,2 dimethyl-3-propylimidazolium iodide, carried by a vulcanized rubber containing clay (abstract; [0009]; [0034-39]; [0112]; [0200-0207]). This definition of ionic liquid is supported by Zakeerunddin et al., who also relate to an electrolyte for a photovoltaic device and define ionic liquid or “room temperature molten salt” as an electrochemically active salt having a melting point lower than ambient temperature, or a salt selected so that the mixture formed by this salt and another species of the redox system has a melting point lower than ambient temperature, illustrating the general formulae (a) and employing 1,2 dimethyl-3-propylimidazolium iodide in electrolyte example VI (abstract; [0047-52]; [0076-77]).

Yoshikawa et al. do not expressly teach that the clay in the vulcanized rubber contains a layered clay mineral and/or an organically modified layered clay mineral as

per claim 1 or that the layered clay mineral and/or an organically modified layered clay mineral is produced as per claims 2 and 3.

Tanaka et al. also relate to vulcanized rubber and teach a clay composite rubber material comprising layered clay minerals modified by gum oligomers and organic onium ions (abstract; Fig. 1; [0006-13]; [0033-35]).

It would have been obvious to one of ordinary skill in the art at time of invention to have used the clay composite rubber material of Tanaka et al. as the vulcanized rubber in the electrolyte of Yoshikawa et al., because the skilled artisan would have appreciated making the electrolyte of Yoshikawa et al., which is a thin layer requiring excellent safety and durability and low price, using the clay composite rubber material of Tanaka et al. which has high elastic modulus and excellent mechanical property, is suitable for producing thin material and mold goods of complicated shape, and can be manufactured easily (Yoshikawa [0009]; Tanaka [0001]). As per claims 2 and 3, the instant claims are product-by-process claims and product-by-product claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430,

433 (CCPA 1977). See MPEP § 2112.01. In this case, the ionic liquid would have been carried on the clay composite rubber material containing the layered clay mineral organically modified by organic onium ions (Yoshikawa abstract; [0009]; [0034-39]; [0112]; [0200-0207]; Tanaka abstract; Fig. 1; [0006-13]; [0033-35]).

Regarding claims 4, 10, and 12, said ionic liquid is an imidazolium salt, 1,2 dimethyl-3-propylimidazolium iodide (abstract; [0200-0207]).

Regarding claims 5, 11, 13, and 14-16, Yoshikawa et al. teach a photovoltaic device comprising a photoelectrode including a transparent conducting layer and a metal oxide semiconductor film, a counter electrode arranged facing said photoelectrode and an electrolyte layer arranged between said photoelectrode and said counter electrode, wherein electrolyte layer is an electrolyte according to claims 1-4, respectively (Figs. 1 and 3-5; [0007]; [0247]; [0250]; [0280]; [0282]). Yoshikawa et al. teach using porous TiO<sub>2</sub> particles having a primary particle diameter of 30 nm in the metal oxide semiconductor film ([0466-467]); the metal oxide semiconductor film has to be mesoporous.

Regarding claim 9, Yoshikawa et al. teach a dye-sensitized solar cell comprising a photovoltaic device according to claim 5 and a photosensitizing dye carried on the metal oxide semiconductor mesoporous film of the photovoltaic device ([0007]).

**5. Claims 6-8 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al., Zakeeruddin et al., and Tanaka et al. as applied to claims 1 and 5 above, in view of US 2005/0072462 to Kang et al.**

Regarding claims 6-8 and 17-20, the claimed conductive substrate is considered to be the counter electrode of claim 5 and its structure is a conductive polyaniline coating on a substrate. Yoshikawa et al. teach a counter electrode **4** (abstract).

Yoshikawa et al. do not expressly teach that the counter electrode is obtained by coating, on a substrate, a conductive polyaniline dispersion as claimed.

Kang et al. also relate to a photovoltaic device and teach a counter electrode coated with polyaniline (abstract; [0024]).

It would have been obvious to one of ordinary skill in the art at time of invention to have used a counter electrode coated with polyaniline like that of Kang et al. in the photovoltaic device of Yoshikawa et al., because the skilled artisan would have used a conventionally used counter electrode in the same device and would have obtained expected results. A photovoltaic device or dye-sensitizing solar cell comprising the counter electrode would have also been obtained. Product-by-product claims 6-8 and 17-20 are not limited to the manipulations of the recited coating and polymerization steps, only the structure implied by the steps. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). See MPEP § 2112.01.

***Response to Arguments***

6. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection. Applicants argued that 1,2 dimethyl-3-propylimidazolium iodide is not an ionic liquid. The Examiner respectfully disagrees and cites a newly discovered reference to Zakeerunddin et al. who provide a general formulae (a) for ionic liquid and illustrate with 1,2 dimethyl-3-propylimidazolium iodide as an example that fits the general formulae in an electrolyte. Applicants then argued that Yoshikawa et al. do not disclose or teach layered clay mineral and/or organically modified layered clay mineral in the ionic liquid. The claims do not specify the structure or relationship between the layered clay mineral and the ionic liquid. The Examiner cited a newly discovered reference to Tanaka et al. to address vulcanized rubber known to contain layered clay mineral and/or organically modified layered clay mineral. As a result, it would have been obvious to one of ordinary skill in the art at time of invention to have arrived at an electrolyte comprising a layered clay mineral and/or organically modified layered clay mineral and an ionic liquid.

***Note to Applicants***

7. Currently, claim 1 contains an open-ended term "comprising" which does not exclude unnamed elements and does not specify any structure of the electrolyte. To further the prosecution, Applicants are encouraged to consider amending claim 1.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HENG CHAN whose telephone number is (571)270-5859. The examiner can normally be reached on Monday to Friday, 9:30 am EST to 6:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer K. Michener can be reached on (571)272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer K. Michener/  
Supervisory Patent Examiner, Art Unit 1728

/HENG M CHAN/  
Examiner, Art Unit 1728